

NOTE ON THE PREPARATIONS AND USES OF THE BAEL FRUIT.

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HAVING recently been occupied in making some inquiries regarding the Bael fruit, it has occurred to me that their publication, in connexion with the preceding note by Dr. Cleghorn, might be not unacceptable to many members of the profession, who have not previously had their attention directed to the medicinal virtues of this simple, cheap and agreeable vegetable astringent, the preparations and uses of which, it is to be presumed, are not well known, especially in the Madras and Bombay presidencies. I purpose, therefore, to consider the subject somewhat in detail, and to give some fresh assurances and practical elucidations of the value of Bael as a native remedy, which has not been sufficiently tested, and on which we require information more ample and authoritative than the cursory notices I have seen in books.

There is indeed strong reason to suspect that the occasionally unsatisfactory results of its use have been owing to imperfect administration of the remedy, either from inattention in the selection of the fruit or carelessness in its preparation; to determine therefore the relative worth and preferableness of one form to another, is an inquiry by no means unimportant nor uninteresting.

I may add to Dr. Cleghorn's account of the tree, that it flowers during the hot season, the fruit ripens after the rains, and is in perfection and, in Bengal at least, in great abundance, during the cold weather, when three or four of the largest size may be purchased for a piec: at present the mature fruit is very scarce and dear, but not beyond a few annas each.

As many of my readers may not have Dr. W. O'Shaughnessy's *Bengal Dispensatory* to refer to, I extract the following particulars, to be found under Art. *Aegle*, page 233:

"The statements we find in oriental works on *Materia Medica*, are very various as to the qualities of this tree and its products. Rheede

says a decoction of the bark of the root is considered in Malabar to be very useful in hypochondriasis, melancholy and palpitation of the heart, and that the leaves are used in decoction in asthmatic complaints. The same author adds that the unripe fruit is of use in diarrhoea. Among the Javanese the fruit is deemed very astringent. Roxburgh correctly states the fruit to be delicious to the taste and very fragrant.

"In the *Asiatic Researches*, vol. ii., p. 349, we find it stated that the fruit is nutritious, warm and cathartic, its taste delicious, its fragrance exquisite, its aperient and detergative qualities and its efficacy in removing habitual costiveness, have been proved by constant experience. The mucus of the seeds is for some purposes a very good cement."

In the *Transactions of the Medical and Physical Society of Bengal*, vol. iv. p. 110, there is a brief notice of the Bael, by Baboo Ramcomol Shen: he prefaces it with a botanical specification of the plant by Dr. Carey, and then proceeds to an account of the preparations and uses, which I extract in full, as the work is now very scarce :

"In Bengal the parts of the tree which are employed are the bark of the root and stem, the leaves and the fruit, both immature and ripe.

"The bark of the root is peeled whilst fresh, and a decoction of it is made, in the proportion of two tollas, or about an ounce, to eight chittacks, or about a pint, of water; it is boiled to one-fourth, and administered in bilious fevers.

"The bark of the tree is sometimes used in fever, but rarely alone, being more usually one of those mixtures which are known as combinations of fourteen or eighteen substances, and given in remittents ; when used alone, it is given in a similar decoction as the bark of the root.

"The expressed juice of the leaves diluted sometimes with a little water, is commonly given in colds and incipient fevers, when the patient complains of general dulness, pains in his limbs and sense of fulness of stomach ; the juice is slightly bitter and pungent, and induces perspiration. The young leaves are also used in ophthalmia, and are made warm and so applied to the eyes to relieve pain and inflammation. The unripe fruit is cut into small slices and dried, and a decoction is formed of the dry pieces, by boiling them in the same proportion as the bark. It is in this preparation that the medical properties of the plant are most decidedly manifested, and the decoction of the dried unripe fruit is a most valuable remedy in diarrhoea and dysentery.

"It is particularly serviceable in the bowel complaints of children, but is also of benefit in several stages of such diseases in adults.

"The other forms in which the fruit is employed belong rather to diet than medicine, but they deserve to be noticed as employed in such disorders ; a preserve is likewise prepared from the fruit, before it is ripe, by boiling with syrup, which is also given to patients labouring under bowel complaints with benefit, when every other article of food

is the cause of fresh excitement, and attended with a feeling of oppression after being taken into the stomach.

"The ripe fruit is also beneficial in the same way. A sort of shurbet is prepared from it with tamarind juice, which has rather an opposite effect, but it is on that account beneficial in fevers, and inflammatory affections attended with thirst.

"The glutinous matter about the seeds, is used by painters as a size and varnish. The Bael is not the less esteemed by the Hindu, that the tree is held particularly sacred to Mahadeva, and is always worshipped at festivals celebrated in honor of him or his spouse, or at the Doorga Pooja, and similar celebrations."

The uses of the Bael have been recently brought to the notice of the profession in England by Mr. J. Ranald Martin, late of the Bengal Medical Service, in his admirable papers "*On the Nature and Treatment of the Diseases of Europeans on their return from Tropical Climates,*" published last year in the *Lancet*, and the fruit is now imported in its dried and preserved forms from Calcutta by Mr. John Savory and by Mr. Pound, of Oxford Street.

Early History.—I cannot find any reference to the Bael in Dr. Wise's commentary on the Hindu system of medicine; it is not noticed in that work as a remedy either in diarrhoea or dysentery; yet, there can be no doubt of the antiquity of its use in these affections, as would appear from the following extracts, which have been made for me by native Dr. Doorga Persaud, from the Sushruta, or system of medicine taught by Dhanantwari, the physician or holy sage:

"Bael is hard, bitter and gummy, unpleasant to the taste, heating to the bowels and indigestible; it is astringent and often causes griping."—"The full formed fruit confines the bowels and causes indigestion, and a sense of heat in the stomach."

"The fully ripe fruit causes loss of appetite, indigestion, heat in the bowels, and sometimes pain from accumulation of flatus: it increases expectoration and the flow of bile."

Popular Uses.—It is much used throughout Bengal, being one of the best known and most popular medicines of the people. The native physicians prescribe it in cases of dysentery and chronic diarrhoea, mixed with catechu and sugar.

The following memorandum, obtained from a hakeem of Calcutta, represents generally the opinion and practice of the present day.

"The unripe Bael, when gummy and white, is used as an astringent in diarrhoea, which is very prevalent during the rainy season in Bengal. It is given in the form of slurbet, prepared as follows :

"Squeeze the Bael and keep it exposed to the open air for a whole night,* boil and strain, add some sugar, and give for each dose a wine glassful twice a day.

"The Bael when ripe is given as a digestive and slight aperient medicine, it is also known to be carminative, when taken in the form of syrup or preserve.

"The syrup is prepared as follows : Pulp of Bael and Sugar, of each 2 tolas.

"The bran of Essubgole 6 mashas, rose water or confection of roses 1 tola, water a wine glassful. Mix and give 3 or 4 times a day.

"The following is the usual formula in dysentery :

Bael mixed with dried shell of Mangosteen,..... 4 masha.

Flour of pomegranate, 4 ditto.

Syrup of Bael,..... 1 tola."

mix for a dose to be given 3 times a day."

BAEL SHERBET.

Preparations.—A sherbet is the mode of preparation almost universally used both in native and European practice: it is made for immediate use, and with little trouble, from the ripe or half-ripe fruit. Take about 2 ounces of the strained soft gummy interior, mix it with 3 or 4 ouncees of water, sweeten it with sugar, and to render the mixture more grateful cool it artificially, or add a lump of ice.

This forms an agreeable drink, which possesses the aroma of the fruit, and may be repeated two or three times a day. When prepared from the ripe fruit, it is not only astringent, but possesses also the singular property of being aperient, if the bowels be irregular and constive: this last quality it seems to derive from being stomachic and promoting assimilation.

When the patient is much reduced in strength, and his stomach weak, the sherbet sometimes disagrees: it ought then to be given in small and repeated doses, and if these also are rejected, a more concentrated form, as that of extract, may be tried.

BAEL MARMALADE.

This is prepared in the same manner as the orange marmalade, and is usually taken, like it, spread on bread: it has the advantage of keeping well and all the peculiar qualities of the fruit are preserved undeteriorated.

* This exposure to air and moisture will decompose the tannin, which, by absorption of oxygen, is converted into gallic acid, not an improvement, I should say.

CONSERVE OF BAEL.

I am indebted to Dr. J. Jackson for the following recipe for a conserve, of which he speaks very highly :

"Take 40 Bael fruit, pass the pulp through fine muslin (no water to be added) take six seers of fine white sugar, boil it into a syrup, then put in the Bael, and boil them well together on a slow fire, until the whole is made into a jelly.

"The sugar should be well cleansed of all scum, before the cleared pulp is put in."

EXTRACT OF BAEL.

At times, however, all the above preparations will, either from their bulk or sweetness, disagree with the patient, and it becomes an object to obtain the medicine in a form more concentrated and more convenient for prescribing.

By the kindness of Mr. Scott, of the Government Dispensary, I am able to submit the following formula for an extract, which I have used with favorable results. In forwarding to me some for trial, Mr Scott says "This extract will keep for any length of time. You will perceive it retains the taste and aroma of the fruit, and I am certain also its medicinal principles, for, in preparing it, I have only rejected the starch and other insoluble portions of the fruit."

Its consistence is uniform, and like molasses, its color, a dark brown or mahogany, and the smell that of the peculiar aroma of the Bael. Its dose is from half a drachm to a drachm two or three times a day, or even oftener.

It should be used when recent, at least I have not found it to keep so well as stated by Mr. Scott, and I think that for transmission to Europe, it would be an advantage, if it could be preserved by drying.

The extract prepared from the unripe fruit keeps better than that made from the ripe, which contains much saccharine matter, and is therefore more liable to ferment.

FORMULA.

"Select caugzee Baels, such as have thin and even shells, and are perfectly matured. Take out the pulp and throw it into an oblong tin or earthen vessel, covering it over with water, and then churn it as you would butter for a couple of hours, throw this on a stout calico strainer, and when the whole of the *clear solution* has passed through, replace the contents of the strainer again into the vessel, with half the quantity of water, and churn it again for a couple of hours; filter as before, and

continue to do so, until the liquid passes through the filter, *tastelesse*. While the process is going on, bruise the shells of six Baels and boil them well in two pounds of water, filter the solution through the calico strainer, add to it the filtered solution of the fruit, and having put the mixed solutions in an evaporating dish, over a water-bath, evaporate them down to the consistence of a good extract.

"If the medicinal properties of the Bael depend on the tannin it contains, this extract, which is made only from the soluble portion of the fruit, must contain it also, in all its integrity."

Mr. Scott has also favored me with the following formula for a concentrated syrup, the astringent qualities of which I have tested: it is well suited for administration to children suffering from diarrhoea.

"CONCENTRATED SYRUP OF BAEL.

"Take an ounce of the extract, and dissolve it in 20 ounces of water, adding eight or ten ounces of sugar-candy according to taste, and evaporate it on a water-bath to the consistence of a syrup."

DRIED BAEL.

This appears a very simple and convenient form of preparation. Dr. Chuckerbutty says of it—

"We have latterly been trying to preserve the Bael by straining the pulp through a coarse sieve, and then baking it into a thin cake; this seems to answer very well, while the astringent properties of the fruit suffer no diminution. The process was suggested and put into practice by our Hospital Steward, Mr. Bowser."

With reference to my own experience in the use of the Bael, I may state that I have been in the habit of recommending the sherbet as an aperient to persons subject to habitual constipation: a small tumbler-full taken early in the morning will produce one evaeuation daily. In cases where there was dyspepsia with obseure symptoms of land-seurvy, it seemed to act very favourably, and to possess alternative as well as anti-seorbutie qualities.

Many persons in Bengal suffer, espeecially during the rainy season, from attaeks of irregularity of the bowels, periods of looseness alternating with others of constipation; in such states of the system the sherbet acts admirably in the first instance as an astringent and in the seeond as an aperient: it seems in both these opposite conditions to stimulate the mucous membrane to more natural and regular action, combining with the ingesta and aiding healthy assimilation. I have also given it with very satisfactory results

to persons of delicate and weakly habit subject to excessive mucous diarrhoea. But I have chiefly employed it in cases of chronic dysentery and diarrhoea among native prisoners in our Bengal jails. Most of such patients are in a condition of greatly depressed vitality, either anemic, scorbutic, or debilitated and anasarcaous, as in the last stage of spleen disease: here mercury cannot be given in any form, for it acts as a poison, and opium checks the secretions of the liver. The Bael generally failed, as every other medicine would have failed to effect a cure, but it often did more good than any other remedy, and was always of temporary and palliative benefit: the patients had great faith in it. When a stimulant was indicated, I used to allow with the Bael a small quantity of the *tharee*, or palm-wine.

Within the last two months I have had treated under my observation 15 cases of sub-acute dysentery and four of diarrhoea in natives with uniform success, by means of the extract of Bael prepared both from the immature and the ripe fruit.

Dr. Duncan Stewart informs me that for years past he has employed the Bael both in his private and Hospital practice: he never uses any other form than a sherbet of the ripe fruit, and he prescribes it not only as an astringent in disease but as a preventive of diarrhoea in persons subject to that complaint. A few days ago Dr. Stewart obligingly took me to see one of his patients, a gentleman lately returned from Pegu, suffering from severe chronic dysentery, in whom the Bael sherbet acted with immediate and manifest effect, checking the dysentery, and greatly improving the secretions from the intestinal canal.

I learn from Dr. J. Jackson that he has found the Bael successful in the more chronic forms of dysentery when the stools are frequent and bloody, mixed with mucus; when there is much heat of skin, he does not find it agree well, and he has often been obliged to discontinue it in consequence of the flatulence and indigestion it causes. The most successful use of the remedy he first saw was in the case of a highly-esteemed Medical officer, late of this service, who seemed in a hopeless state, all other remedies having failed to mitigate the symptoms.

Dr. Jackson also states that, as a regulator of the bowels, half a tumbler of the sherbet with a little sugar will act in producing one healthy evacuation, and that he has known many people take it in this way as an aperient. In the diarrhoea after cholera, he has used the sherbet very beneficially.

I am indebted to Dr. Chuckerbutty for a very interesting communication, from which the following is an extract :

" In answer to your questions, I beg to observe that I believe the astringency of the Bael is much injured when it is perfectly ripe. I think this is due to the great quantity of sugar generated in the ripe fruit; I have always found it to sit heavy on the stomach, to diminish the appetite, and to give rise to flatulency. Given in this state to a patient suffering from dysentery or diarrhoea, I have usually found it to cause increased distress. But the exposure of the Bael to the action of fire until its shell assumes a reddish-yellow colour, seems to produce a change in these respects. The burnt Bael has always appeared to me to be a valuable remedy in bowel complaints. It possesses great astringency, while at the same time, it is free from the disagreeable effects above alluded to. After the shell, the seeds and the fibres have been carefully separated, the pulp should be administered in 3*i* or 5*ss.* doses three times a day, either in the form of pills, or mixed with a little water or milk.

" Mr. Fagan, of the Druggist's Hall, College Street, has prepared an extract and a syrup of Bael. I have tried both in dysentery. In the acute stage they seemed to have no effect, nor did they do much service in the typhoid form of the disease; in chronic dysentery, however, they were very valuable, more especially the extract. The syrup disagreed in most cases, but in one it did more good than any other astringent: when the syrup was exhausted, I gave to this patient burnt Bael, and the same benefit was obtained. He is again suffering from increased violence of the symptoms since his supply of Bael was stopped from the want of it in the market. The extract agreed with many patients, and, so long as it lasted, seemed to do good service.

" The fully-formed but unripe Bael, I think possesses the greatest astringency. This also has its qualities improved by the action of fire. Plucked from the tree in this stage and kept for a few weeks, it turns yellow, and its pulp becomes soft and full of sugar, like the pulp of the fully ripe fruit; when less mature, the Bael can be kept longer uninjured than when fully matured.

" The forms in which ripe Bael is popularly employed are the *sherbet* and the *morubbah*. The *sherbet* is taken for either dietetical or medicinal purposes. For dietetical purposes it is prepared by mixing the pulp of Bael with water or milk, straining this through a piece of muslin or any other cloth of thin texture, and adding to the solution a sufficiency of sugar. For medicinal purposes the pulp of Bael and Tamarind are simultaneously mixed with water, strained, and sweetened with sugar. In this form it acts as a mild and useful aperient for delicate persons. In preparing the *morubbah*, the pulp of the unripe fruit is first separated from the shell, and then cut in thin slices and freed from the seeds, and these slices preserved in sugar. It is used exclusively as an article of food, but it disagrees with most stomachs, on account of the quantity of sugar it contains."

Being desirous to ascertain if the popular belief of the immature being more astringent than the ripe fruit, was borne out by its chemical constituents, I applied to Dr. Macnamara, Professor of Chemistry in the Medical College, who kindly favored me with the results of a comparative analysis of both kinds: the following extracts from his letters settle the question in the negative, and are very suggestive and worthy of attention :

" The ripe contains more tannin than the unripe fruit, in the proportion of five to three. It also contains considerably more sugar, also more of the bitter principle and vegetable acid (not tannic).

" After extracting from the fruits the matters soluble in water, I, by means of ether, obtained a balsam having a very strong odour, closely resembling that of the Peruvian balsam. This balsam exists in much larger quantities in the ripe than in the unripe fruit.

" The comparative deficiencies in these substances in the unripe fruit were compensated for by the gummy, extractive and fibrous matters.

" The astringent action of the Bacl must be due to its tannic acid,* and the ripe Bael containing so very much more of this than the unripe, ought to be the most astringent of the two, and so Dr. D. Stewart's experience has taught him. The large quantity of balsam in the ripe Bael must exercise a very powerful influence, as all balsams do, upon the secretions of the intestinal mucous membrane : you would be surprised by the large quantity of this ingredient which exists in the ripe fruit.

" May not the astringent effects of the Bael be due to the tone which it gives to the coats of the intestines, and to its balsam rendering the secretions of the mucous membrane more healthy ? It would then decrease the number of stools in a dysenteric patient, or in an otherwise healthy one, but who is liable to mucous diarrhoea. While in a person of constipated habit, given to good feeding, Bael might act as a laxative, by keeping the mucous secretions healthy, preserving the tone of the muscular coat, and so enabling the intestines, liable to irritation by peccant matters, to expel the crudities : nay probably such people would be very liable to diarrhoea if they intermitted the Bael, and so, even with them, the Bael may be really an astringent."

With a view of further testing the medical utility of the extract of Bael prepared according to Mr. Scott's

* In Mr. J. Ranald Martin's paper in the "*Lancet*," already alluded to, there is an analysis of the imported forms of the fruit, by Mr. Henry Pollock, who states : — " The pulp and the dried shell of the fruit do not appear to me to differ chemically in any respect, except as to quantity. They both contain 1, tannic acid, 2, a concrete essential oil, 3, a bitter principle, which is not precipitated by tribasic acetate of lead, and a vegetable acid. The pulp, as I received it, also contained a considerable quantity of sugar, in which it was preserved. All three of the substances I have mentioned exist in the largest quantity in the rind. There is most acid in the pulp."

formula,* I sent small portions for trial to some of the hospitals in Calcutta, and the reports of its efficacy received from the Medical officers of these institutions are upon the whole very favorable:—I append a few of them—

“ The extract was given in five cases of dysentery, two being in Natives and three in Europeans. In four of these cases it did no good whatever, and the patients ultimately died; the disease being of the worst kind, with great emaciation and frequent motions, very fetid and mixed with putrid blood. In one case (in a European), the extract was given with success, and the following is the report of it† (it is too detailed for insertion.)

“ I thought the Bael useful in the case for which I wanted it. It was the man I showed to you, who had derived benefit from the ice water enemata. He had a relapse, and though I had again recourse to the ice, he did not mend, but he began to improve again quickly after he had the last supply of the Bael. He thinks himself that it is *very fine* for him.”‡

“ Agreeably to your request I beg to state that I employed the extract of the Bael fruit in a case of severe diarrhoea with marked benefit, also in a case of dysentery, with the effect of checking the purging, for a time; this case however ultimately proved fatal. The doses given were half a drachm three times a day. Since then I have successfully used in several cases of obstinate diarrhoea another preparation of the same fruit, *viz.* slices of it preserved in syrup, and I am inclined to think that, instead of losing any of the active properties of the fruit, even a smaller quantity may be effectually given than when in the raw state. This is fortunate, as it can now be given at any time, and the extract could be prepared from it when the fruit is out of season.”§

It may be considered by many of my readers that these remarks on the various preparations of the Bael are somewhat redundant in minuteness, but I would plead in excuse its having appeared to me an anomaly that the fruit should be exported from Calcutta to London, prepared there, and imported into India in expensive forms, which might be easily made in greater perfection in this country: I have been desirous also of obtaining the opinions of other observers relative to the virtues of an indigenous therapeutical agent, our knowledge of which, it must be confessed, is still wanting in precision.

* I have had the extract prepared from the ripe and unripe fruit separately; the therapeutical effects of both seem to be much the same. If made in large quantity when the fruit is in season and cheap, it might thus be brought within the reach of general practice, and form a useful addition to our means of treating dysentery.

† Dr. Chuckerbutty, Medical College Hospital.

‡ Dr. E. Goodeve, Medical College Hospital.

§ Dr. R. Moir, doing duty with H. M.'s 98th Regt.